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(19) **United States**(12) **Patent Application Publication****Levy**(10) **Pub. No.: US 2019/0198212 A1**(43) **Pub. Date: Jun. 27, 2019**(54) **PERSONAL ELECTRONIC DEVICE CASE AND MOUNTING SYSTEM**(71) Applicant: **Marc Levy**, Kirkland, WA (US)(72) Inventor: **Marc Levy**, Kirkland, WA (US)(21) Appl. No.: **16/227,663**(22) Filed: **Dec. 20, 2018****Related U.S. Application Data**

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<i>F16M 11/28</i>	(2006.01)
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<i>F16M 13/04</i>	(2006.01)

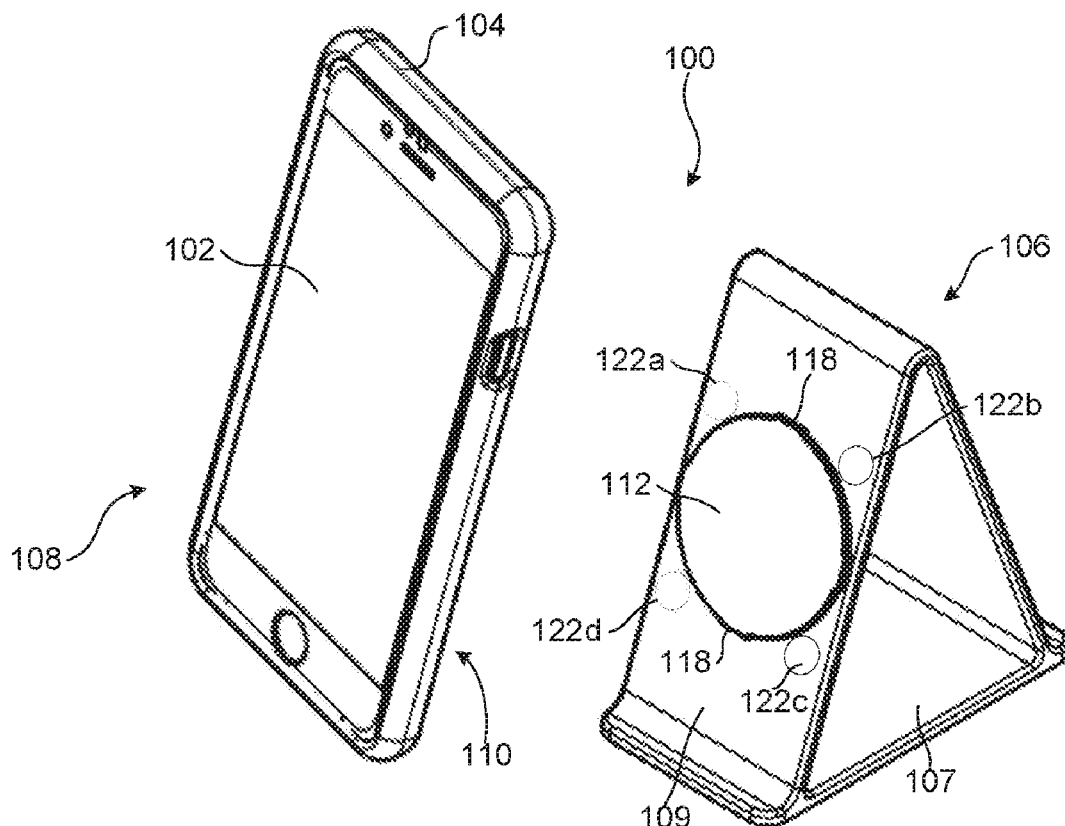
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(57)

ABSTRACT

The present technology relates generally to a personal electronic device case and mounting system. A case for a personal electronic device includes a recess in the back surface of the case and is configured to receive a protrusion on a corresponding mount within the recess. Magnets arranged around the recess are configured to magnetically couple to magnets arranged around the protrusion to aid in securely coupling the case to the mount. The size and shape of the recess and protrusion and the arrangement of magnets allows the case to securely couple to the mount in a plurality of orientations. The recess is positioned over wireless charging circuitry in the device such that wirelessly charging the device is possible when the case is securely coupled to a mount that incorporates a wireless charging pad.



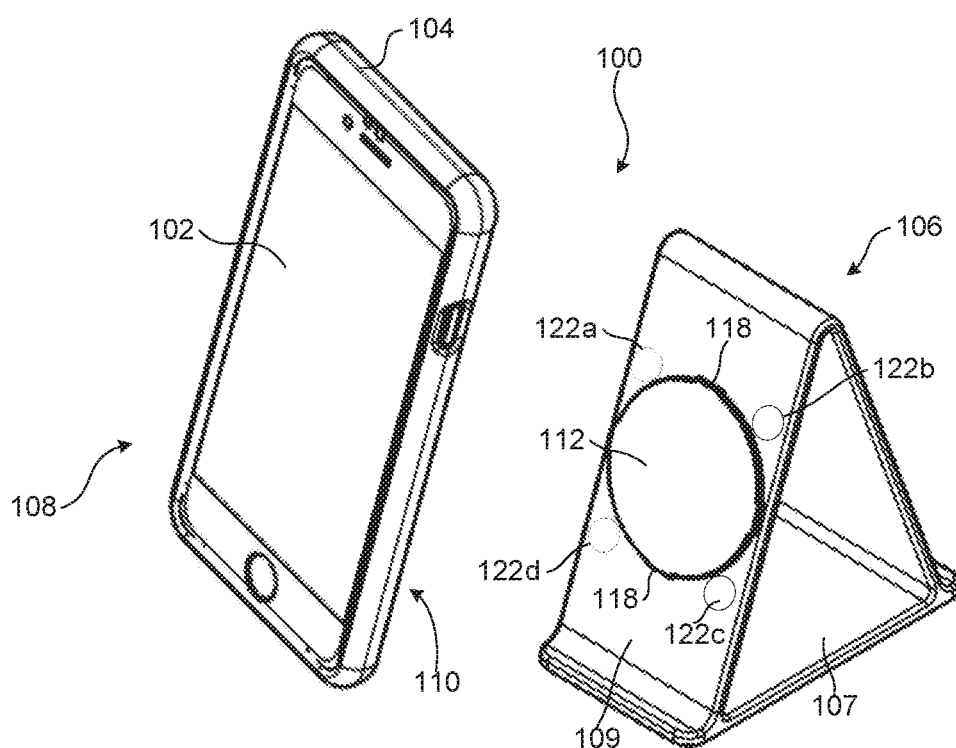


FIG. 1A

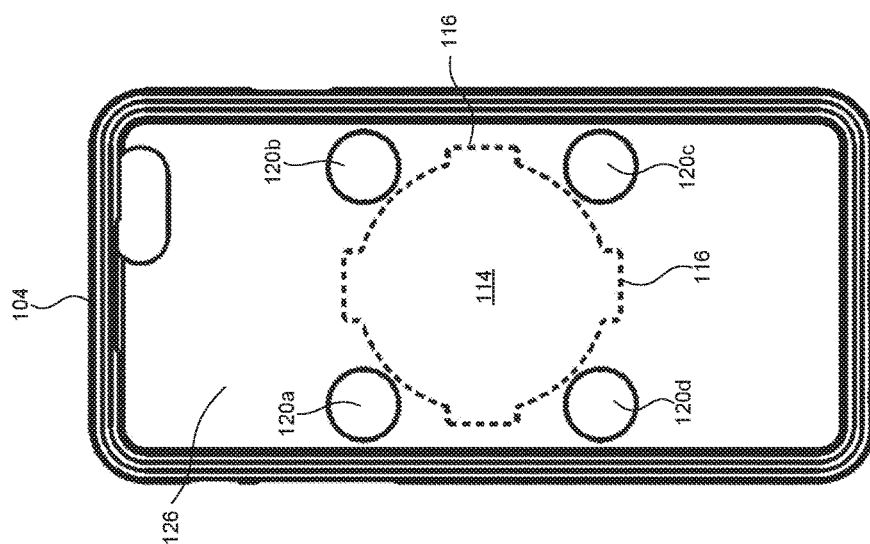


FIG. 1B

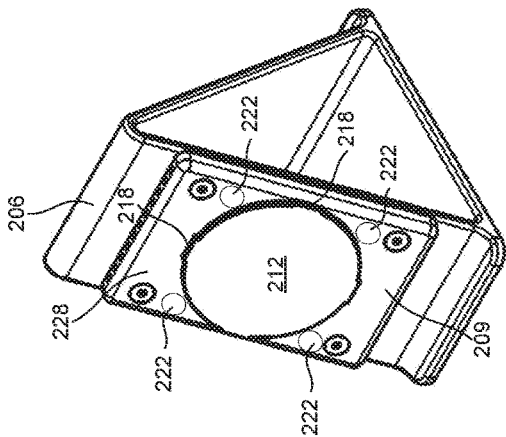


FIG. 2A

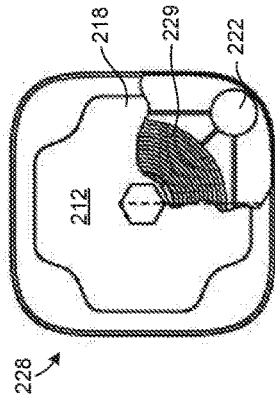


FIG. 2B

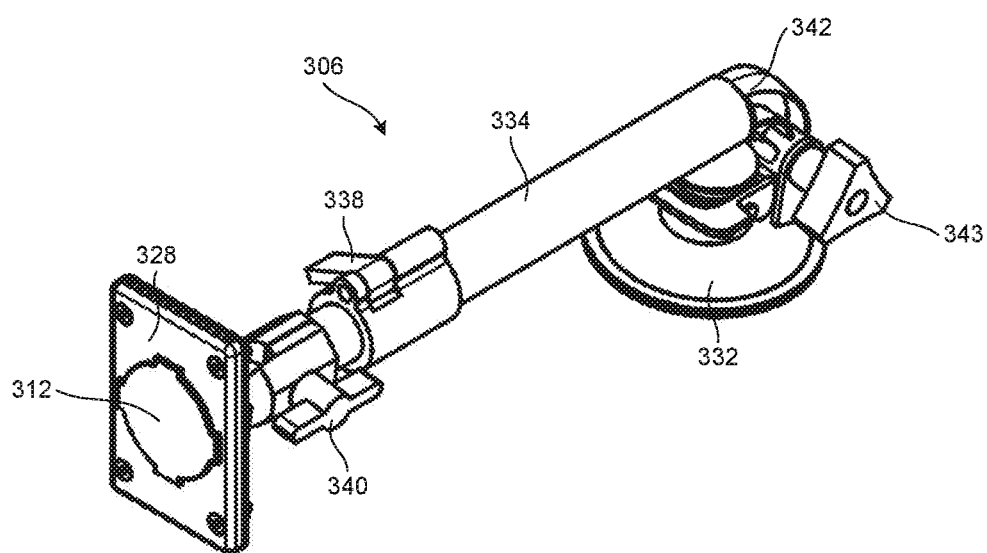


FIG. 3

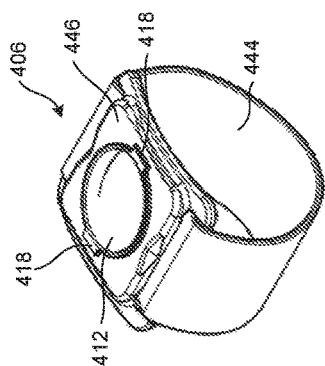


FIG. 4A

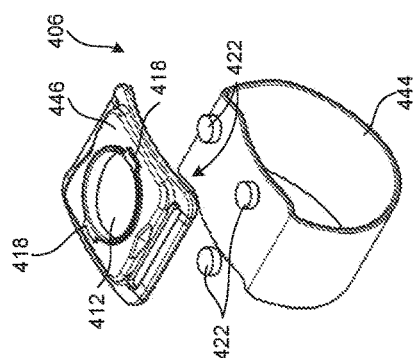


FIG. 4B

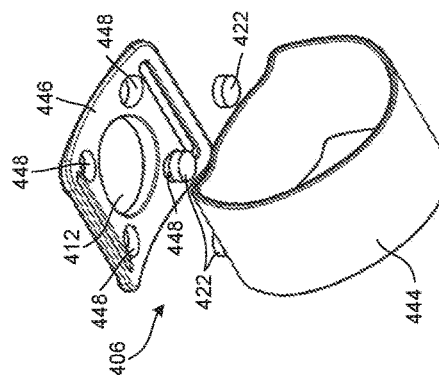


FIG. 4C

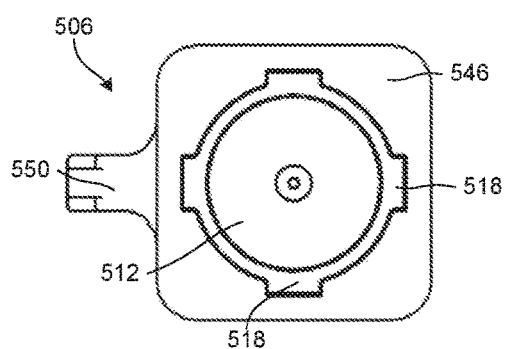


FIG. 5A

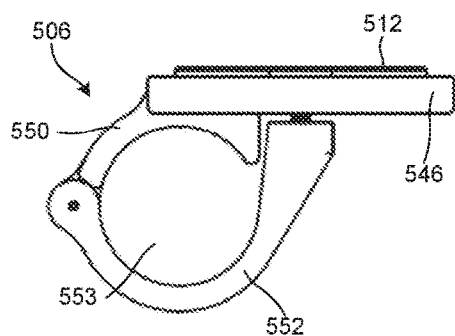


FIG. 5B

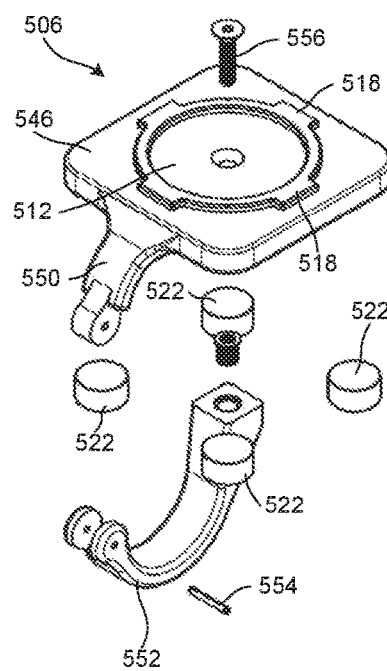


FIG. 5C

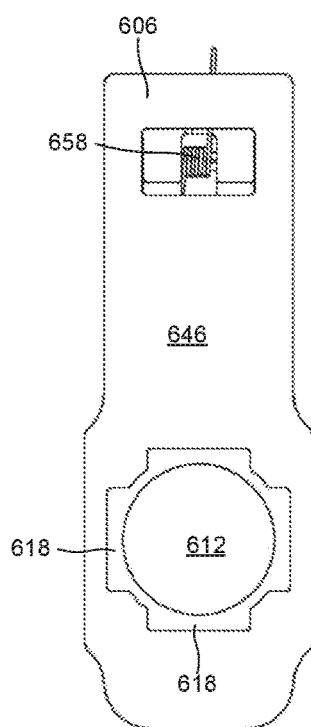


FIG. 6A

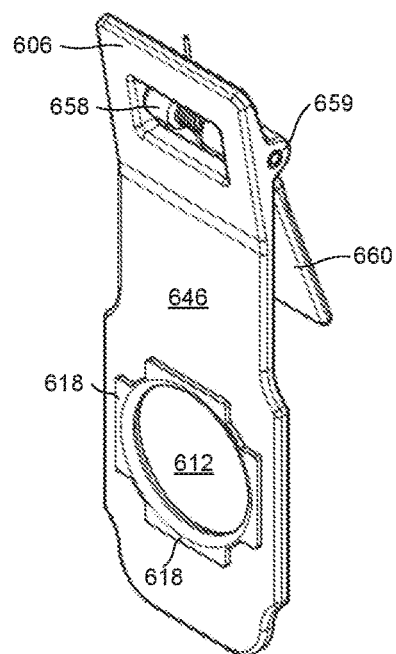


FIG. 6B

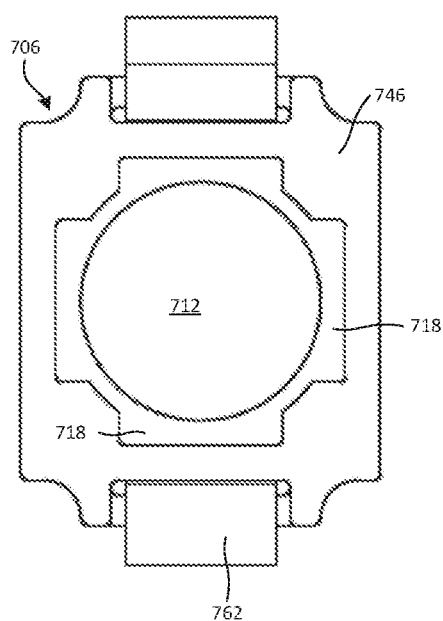


FIG. 7A

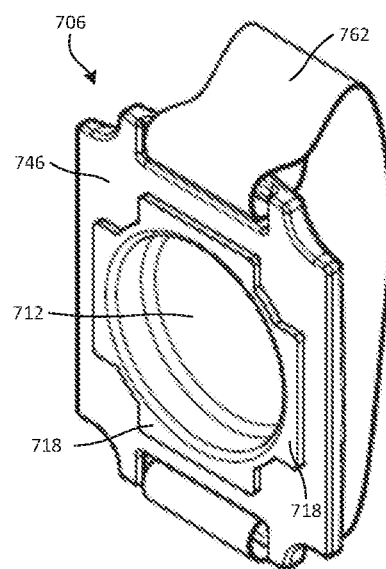


FIG. 7B

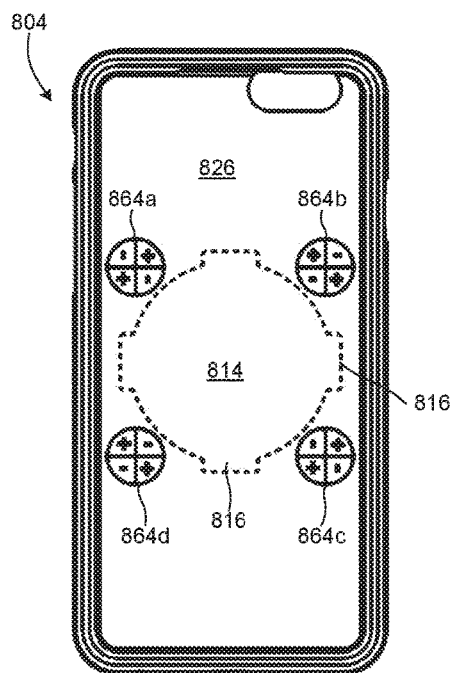


FIG. 8A

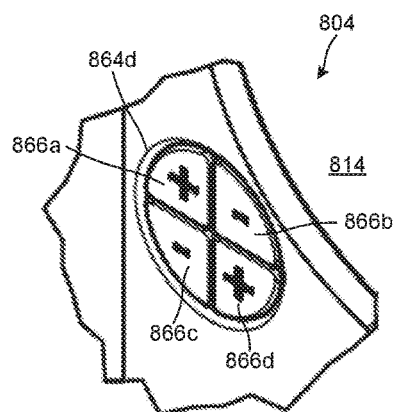


FIG. 8B

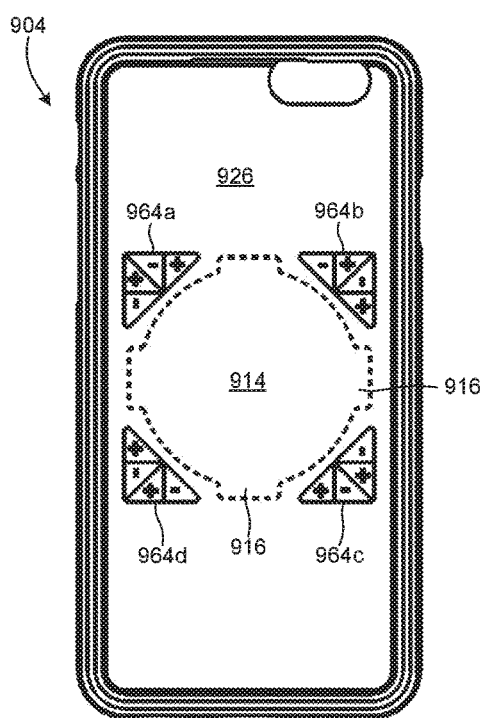


FIG. 9A

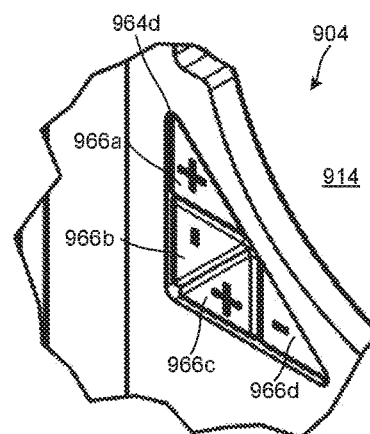


FIG. 9B

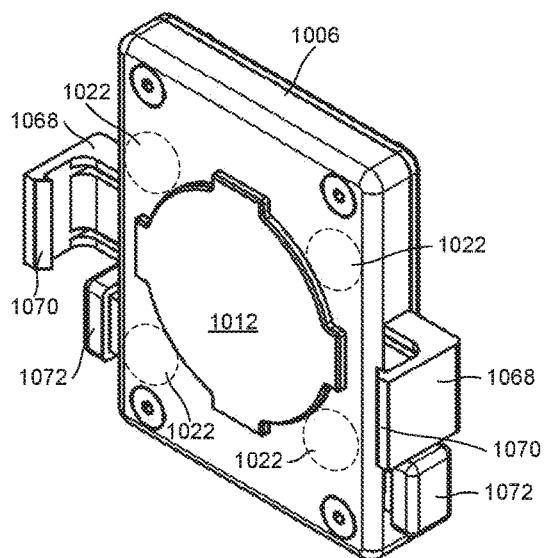


FIG. 10A

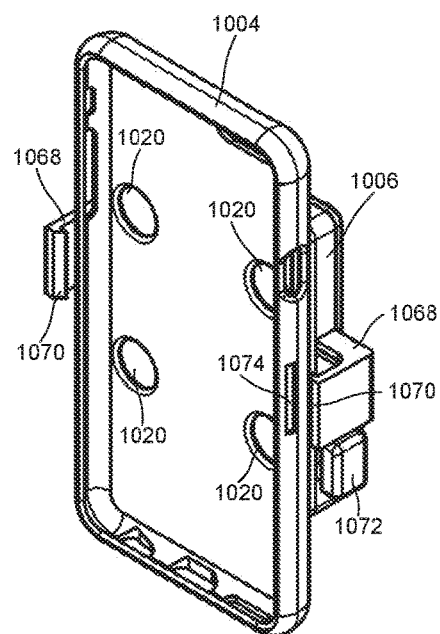


FIG. 10B

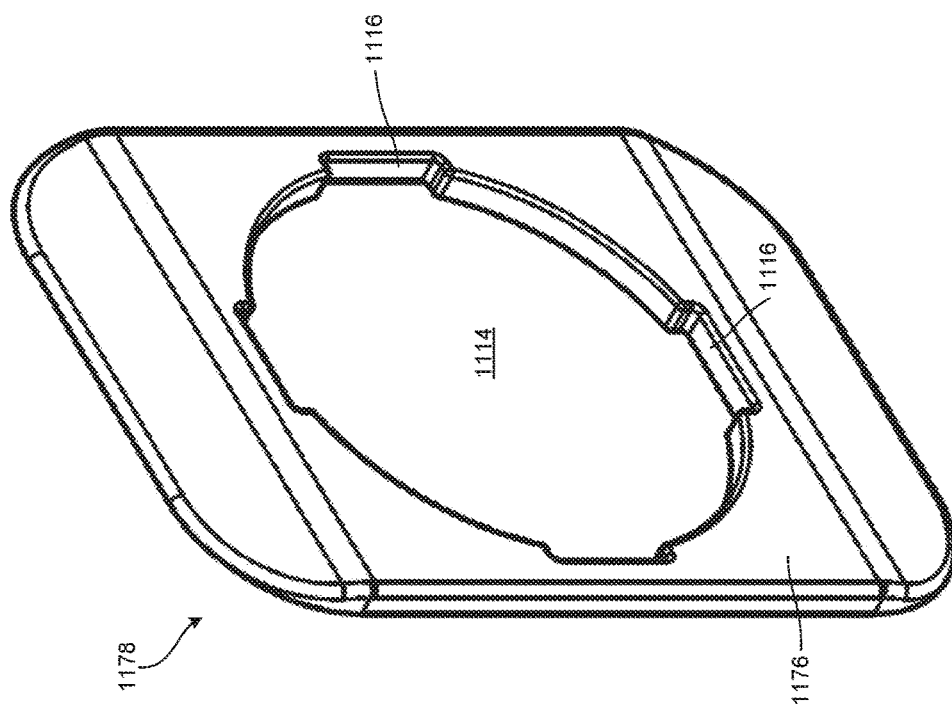


FIG. 11

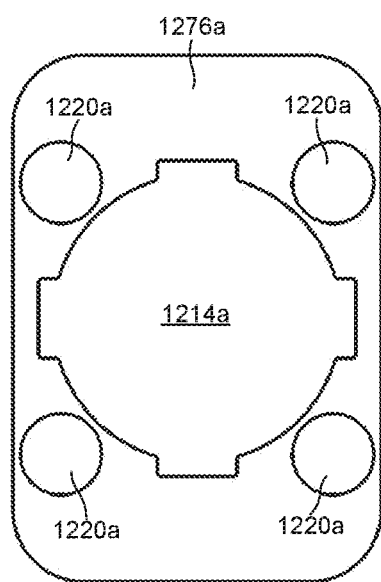


FIG. 12A

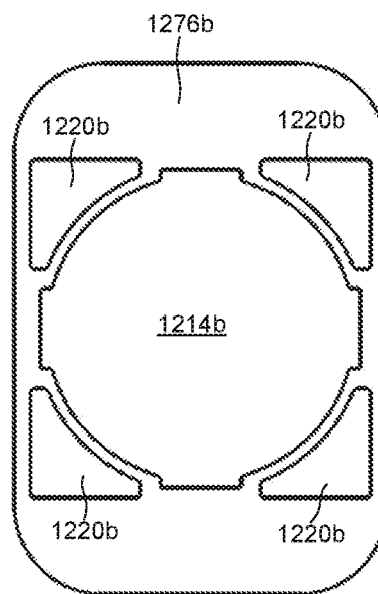


FIG. 12B

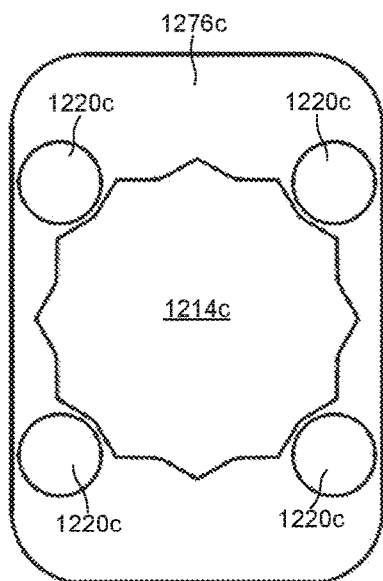


FIG. 12C

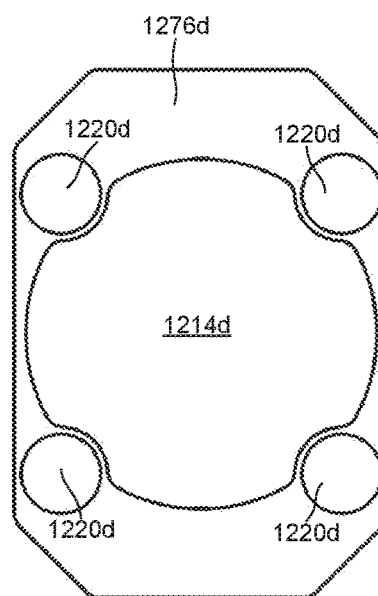


FIG. 12D

PERSONAL ELECTRONIC DEVICE CASE AND MOUNTING SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This non-provisional patent application claims the benefit of and priority to U.S. Provisional Patent Application No. 62/610,002, titled “PERSONAL ELECTRONIC DEVICE CASE AND MOUNTING SYSTEM” and filed Dec. 22, 2017, which is incorporated herein in its entirety by reference thereto.

TECHNICAL FIELD

[0002] The present technology relates generally to personal electronic device cases and mounting systems.

BACKGROUND

[0003] Smart phones, tablets, and other portable electronic devices are common pieces of technology used by many. Typically, using the portable electronic device (PED) requires that a person devote at least one of their hands to holding and manipulating the device, which may inhibit the person's ability to perform other functions while using the device. As an example, people use the modern PED while working at a desk, studying, exercising, moving from place to place, etc. The PEDs often include telephone functionality and/or navigation software designed to help users navigate to a desired destination. Many people often use the PED while operating a vehicle. Many state laws only allow hands-free use of the PED while operating a vehicle to help ensure that the operator's attention remains focused on the task of operating the vehicle. In another example, a person wishing to view the screen of their PED while using a personal computer may be unable to securely arrange the device such that the screen remains constantly visible without the person having to move their hands away from the personal computer to re-orient the device.

[0004] Many modern PEDs include inductive wireless charging circuitry positioned in the device and adjacent to the rear surface of the device. When the device is placed on a wireless charging pad, current flowing through the charging pad interacts with wireless charging circuitry to charge the device's battery. The wireless charging circuitry must be arranged in close proximity to the charging pad area near the conductive coil and the space between the PED and charging pad must be free of conductive material for proper and efficient conductive charging.

[0005] Various conventional mounting accessories have been developed to aid in the hands-free use of PEDs. Some of these mounting accessories utilize clamping mechanisms to hold onto the edges of the personal electronic device. Other mounting accessories incorporate specialized cases for the device that mate with a mounting apparatus, relying on expensive, finely machined features and surfaces to ensure that the case and mounting apparatus remain securely fastened to each other. However, these mounting accessories are often not easy to use, and they sometimes require both hands to securely attach the device to the mounting accessory. Furthermore, the mounting accessories are typically only usable for a single situation. For example, a mounting accessory used to enable the hands-free use of a device while a person operates a vehicle may not be also used to enable the hands-free use of the device while the person rides a

bicycle or sits at a desk. Moreover, mounting accessories that incorporate cases for the personal electronic device are often too thick or include conductive materials which impede/block the wireless charging circuitry, preventing the device from being wirelessly charged while coupled to the mounting accessory.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1A is an isometric view of a PED received within a case and a mounting structure configured in accordance with one or more embodiments of the present technology.

[0007] FIG. 1B is a front elevation view of the case of FIG. 1A with the PED removed from the case.

[0008] FIG. 2A is an isometric view of a mounting structure having a wireless charging pad configured in accordance with embodiments of the present technology.

[0009] FIG. 2B is a top cut-away view of the wireless charging pad of FIG. 2A, in accordance with embodiments of the present technology.

[0010] FIG. 3 is an isometric view of a vehicle mount having a wireless charging pad configured in accordance with embodiments of the present technology.

[0011] FIG. 4A is an isometric view of an arm mount configured in accordance with embodiments of the present technology.

[0012] FIG. 4B is a partially exploded top isometric view of the arm mount of FIG. 4A.

[0013] FIG. 4C is a partially exploded bottom isometric view of the arm mount of FIG. 4A.

[0014] FIG. 5A is top plan view of a handlebar mount configured in accordance with embodiments of the present technology.

[0015] FIG. 5B is a side elevation view of the handlebar mount of FIG. 5A.

[0016] FIG. 5C is a partially exploded isometric view of the bicycle handlebar mount of FIG. 5A.

[0017] FIG. 6A is a front elevation view of a clip mount configured in accordance with embodiments of the present technology.

[0018] FIG. 6B is an isometric view of the clip mount of FIG. 6A.

[0019] FIG. 7A is a top plan view of a strap mount configured in accordance with embodiments of the present technology.

[0020] FIG. 7B is an isometric view of the strap mount of FIG. 7A.

[0021] FIG. 8A is a front elevation view of a PED case having arrays of magnets configured in accordance with embodiments of the present technology.

[0022] FIG. 8B is an enlarged isometric view of a portion of the case of FIG. 8A.

[0023] FIG. 9A is a front elevation view of a PED case having arrays of magnets configured in accordance with embodiments of the present technology.

[0024] FIG. 9B is an enlarged isometric view of a portion of the case of FIG. 9A.

[0025] FIG. 10A is an isometric view of a mount that includes a clamping mechanism configured in accordance with embodiments of the present technology.

[0026] FIG. 10B is an isometric view of a case received within the mount of FIG. 10A.

[0027] FIG. 11 is an isometric view of an interface plate configured in accordance with embodiments of the present technology.

[0028] FIG. 12A is a top plan view of an interface plate configured in accordance with an embodiment of the present technology.

[0029] FIG. 12B is a top plan view of an interface plate configured in accordance with another embodiment of the present technology.

[0030] FIG. 12C is a top plan view of an interface plate configured in accordance with another embodiment of the present technology.

[0031] FIG. 12D is a top plan view of an interface plate configured in accordance with another embodiment of the present technology.

DETAILED DESCRIPTION

[0032] The present technology is directed to a personal electronic device (PED) case and mounting system and associated systems and methods. Several embodiments of the present technology are related to PED cases having magnets configured to couple to magnets on a mounting apparatus and having an opening configured to mate with a protrusion on the mounting apparatus. One aspect of the present technology provides a mounting assembly for a personal electronic device, comprising a case having a back wall and sidewalls connected to the backwall to define an interior area configured to receive the personal electronic device. The back wall has opposing front and rear surfaces, with the front surface facing toward the interior area and being configured to be positioned adjacent to the personal electronic device when the personal electronic device is received within the interior area. A recess is formed in the rear surface. The recess has a central portion and a plurality of registration recesses spaced radially apart from each other. A case magnet is positioned adjacent to the recess and spaced apart from the central portion. A mounting structure is releasably engageable with the case at a selected radial orientation. The mounting structure comprises a receiving surface configured to be positioned adjacent to the rear surface when the case is engaged with the mounting structure. A protrusion extends away from the receiving surface and is configured to be securely received in the recess when the case is coupled to the mounting structure. The protrusion has a central protuberance that fits closely in the central portion of the recess, and one or more radial registration protuberances is positioned to fit in selected registration recess to control a selected radial orientation of the case relative to the mounting structure. A mount magnet is positioned adjacent to the protrusion and is arranged to align with the case magnet when the case is coupled to the mounting structure in the selected radial orientation. The case is mechanically and magnetically restricted from rotating when the case is engaged with the mounting structure.

[0033] Another aspect of the technology provides a mounting assembly for a personal electronic device. The mounting assembly has a case configured to securely receive the personal electronic device. The case comprises a recess formed in a rear surface of the case, a first plurality of case magnets arranged to form a first array positioned adjacent to the recess such that each of the first plurality of case magnets does not overlap with the recess. A second plurality of case magnets is arranged to form a second array, wherein the second array is positioned adjacent to the recess such that

each of the second plurality of case magnets does not overlap with the recess. A mounting structure is releasably coupleable to the case with the case in a selected orientation. The mounting structure has a protrusion extending away from a receiving surface and configured to closely fit in the recess when the case is coupled to the mounting structure. A first plurality of mount magnets arranged to form a third array is positioned adjacent to the protrusion such that each of the first plurality of mount magnets does not overlap with the protrusion. A second plurality of mount magnets is arranged to form a fourth array positioned adjacent to the protrusion such that each of the second plurality of mount magnets does not overlap with the protrusion. When the case is coupled to the mounting structure in the selected orientation, selected first case magnets are positioned over and magnetically coupled to the selected mount magnets, and selected second case magnets are positioned over and magnetically coupled to selected mount magnets.

[0034] Another aspect of the technology provides a mounting assembly for a personal electronic device. The mounting assembly has a case with an interior area configured to receive the personal electronic device. The case has a recess formed therein with a central portion and a plurality of registration recesses spaced apart from each other. A case magnet is positioned adjacent to the recess and spaced apart from the central portion. A mounting structure is releasably engageable with the case at a selected orientation. The mounting structure has a protrusion configured to be securely received in the recess when the case is engaged with the mounting structure. The protrusion has a central protuberance that fits closely in the central portion of the recess. One or more registration protuberances is adjacent to the central protuberance and is positioned to fit in selected ones of the registration recesses to control a selected orientation of the case relative to the mounting structure. A mount magnet is positioned adjacent to the protrusion and is arranged to align with the case magnet when the case is engaged with the mounting structure in the selected orientation. The case is mechanically and magnetically restricted from rotating when the case is engaged with the mounting structure.

[0035] Specific details of several embodiments of the present technology are described herein with reference to FIGS. 1A-12D. Although many of the embodiments are described with respect to devices, systems, and methods for mounting a personal electronic device, it should be noted that other applications and embodiments in addition to those disclosed herein are within the scope of the present technology. Further, embodiments of the present technology can have different configurations, components, and/or procedures than those shown or described herein. Moreover, a person of ordinary skill in the art will understand that embodiments of the present technology can have configurations, components, and/or procedures in addition to those shown or described herein and that these and other embodiments can be without several of the configurations, components, and/or procedures shown or described herein without deviating from the present technology.

[0036] FIGS. 1A and 1B illustrate a mounting system 100 in accordance with an embodiment of the present technology. The mounting system 100 has a case 104 that receives a personal electronic device 102 (also referred to as a "device") and a mounting apparatus 106 (also referred to as a "mount") configured to be securely and releasably coupled

to the case **104** (FIG. 1A) illustrating the features on the rear surface **110** of the case **104**. The device **102** is received within the case **104** such that a front surface **108** of the device **102** remains exposed while the edges and rear surface of the device **102** are enclosed within the case **104**. The mount **106** may be a desk (or table) mounting apparatus having a base portion **107** configured to be placed against a flat surface (e.g., a desk or a table) and having a receiving surface **109** on which the case **104** is received.

[0037] To ensure that the case **104** remains properly oriented relative to the mount **106** and is restrained from moving when the case **104** is coupled to the mount **106**, the mount **106** and the case **104** include mating alignment features. For example, the mount **106** includes a shaped protrusion **112** formed on the receiving surface **109** (FIG. 1A), and the case **104** includes a similarly shaped recess **114** (FIG. 1B). The protrusion **112** extends away from the receiving surface **109** of the mount **106**, and the mating recess **114** is formed in the rear surface **110** of the case **104**. The recess **114** is configured to receive the protrusion **112** when the case **104** and the mount **106** are securely mated to each other. The recess **114** and protrusion **112** are sized and shaped such that the protrusion **112** fits snugly within the recess **114**, thereby limiting any translational movement of the case **104** relative to the mount **106**.

[0038] In the illustrated embodiment, the protrusion **112** has a generally circular shape and a plurality of alignment and anti-rotation tabs **118** spaced around the perimeter of the protrusion **112**. Similarly, the recess **114** has a generally circular shape and a plurality of cut-outs **116** (FIG. 1B) spaced around the perimeter of the recess **114** so as to receive the tabs of the protrusion **112** when the protrusion **112** is mated in the recess **114**. The size, number, and position of the tabs **118** and cut-outs **116** are such that, when the case **104** is removably engaged with the mount **106**, the protrusion **112** is securely received within the recess **114**, and each of the tabs **118** is positioned within a given one of the cut-outs **116**. Arranging the tabs **118** within the cut-outs **116** limits the ability of the protrusion **112** to rotate within the recess **114**, thereby restricting the undesired rotation of the case **104** relative to the mount **106**.

[0039] The case **104** also includes a plurality of case magnets **120a-d** disposed in the inner surface **126** and arranged adjacent to and radially outward of the recess **114**. Similarly, the mount **106** includes a plurality of mount magnets **122a-d** disposed in the receiving surface **109** and arranged adjacent to and radially outward of the protrusion **112**. In the illustrated embodiment, four case magnets **120a-d** are positioned such that, when the case **104** is coupled to the mount **106**, each of the four case magnets **120a-d** is adjacent to one of the corresponding one of the four mount magnets **122a-d**. Although the illustrated embodiment has four case magnets **120a-d** and four corresponding mount magnets **122a-d**, other embodiments can have different numbers of mating magnets. In addition, the number of case magnets **120** can be different than the number of mount magnets **122**.

[0040] The illustrated case magnets **120a-d** are disk-shaped permanent magnets having fixed north and south poles, where all four of the case magnets **120a-d** are oriented such that their north poles are aligned along a common direction relative to the inner surface **126**. Similarly, the mount magnets **122a-d** are disk-shaped permanent magnets having fixed single north poles and fixed south poles, where

all four of the mount magnets **122a-d** are oriented such that their north poles are aligned along a common direction relative to the receiving surface **109**. When the case **104** is securely positioned onto the mount **106** with the protrusion positioned in the recess **114**, the case magnets **120a-d** and the mount magnets **122a-d** are oriented such that each of the case magnets **120a-d** is magnetically coupled to a corresponding one of the mount magnet **122a-d** with alignment of the respective north and south poles, such that the protrusion **112** is securely and magnetically retained in the recess **114** with the case **104** in the selected orientation relative to the mount **106**. Because of this arrangement, the case magnets **120a-d** and mount magnets **122a-d** act together to provide a compressive force between the case **104** and the mount **106**. Additionally, when the user brings the case **104** near the mount **106**, the magnets prevent the case **104** but being partially or improperly engaged in the mount **106** and in fact guide the components together for quick and easy attachment and retention in the correct position and orientation.

[0041] In some embodiments, all four of the case magnets **120a-d** are oriented such that the south poles face away from the device **102** while all four of the mount magnets **122a-d** are oriented such that their south poles face away from the receiving surface **109** (i.e., toward the case **104** when the case **104** is coupled to the mount **106**). Because each of the case magnets **120a-d** is arranged directly over a given one of the mount magnets **122a-d** and because the south poles of a case magnet **120a-d** are magnetically attracted to the north poles of a mount magnet **122a-d**, each of the case magnets **120a-d** magnetically couple to a corresponding mount magnet **122a-d**. In other embodiments, however, all four of the case magnets **120a-d** can be oriented such that their north poles are all directed away from the device **102** while all four of the mount magnets **122a-d** are oriented such that their south poles are directed away from the receiving surface **109**. Because the north pole of a case magnet **120** is magnetically attracted to the south pole of a mount magnet **122a-d**, each of the case magnets **120** magnetically couple to a corresponding mount magnet **122a-d**.

[0042] In the illustrated embodiment, the four cut-outs **116** and the four case magnets **120a-d** are symmetrically arranged around a central point of the recess **114**. Similarly, the four mount magnets **122a-d** and the four tabs **118** are symmetrically arranged around a central point of the protrusion **112** such that the case **104** can be releasably retained on the mount **106** in four different orientations. Furthermore, because each of the case magnets **120a-d** have north poles facing a common direction and each of the mount magnets **122a-d** have south poles facing an opposite direction, each of the case magnets **120a-d** is magnetically coupleable to a respective one of the mount magnets **122a-d** over which it is arranged when the case **104** is coupled to the mount **106** in any of the four different mounted orientations. In other words, the magnetic orientations of the case magnets **120a-d** and the mount magnets **122a-d**, along with the positions of the magnets **120a-d** and **122a-d** and the positions of the tabs **118** and cut-outs **116**, ensure that the case **106** remains securely coupled to the mount **106** when the case **104** and mount **106** are in any of the four different mounted orientations. In the illustrated embodiment, the mounted orientation of the case corresponds to a $\pm 90^\circ$ rotation from the next rotational position. These mounted orientations can

correspond to portrait or landscape orientations of the device **102** relative to the mount **106** and/or the structure on which the mount **106** is supported.

[0043] For example, if the user desires for the device **102** to operate in a portrait mode, the case **104** is coupled to the mount **106** such that the top edge of the case **104** is facing upward. In this configuration, the case magnet **120a** is aligned with and magnetically coupled to the mount magnet **122a**, the case magnet **120b** is aligned with and magnetically coupled to the mount magnet **122b**, the case magnet **120c** is aligned with and magnetically coupled to the mount magnet **122c**, and the case magnet **120d** is aligned with and magnetically coupled to the mount magnet **122d**. If the user desires to switch the orientation of the device so it operates in a landscape mode, the user may switch the orientation of the device by separating the case **104** from the mount **106**, rotating the case **104** by 90° and inserting the protrusion **112** into the recess **114**, thereby switching the rotational orientation of the device **102**. In this landscape arrangement, the case magnet **120a** is aligned with and magnetically coupled to the mount magnet **122b**, the case magnet **120b** is aligned with and magnetically coupled to the mount magnet **122c**, the case magnet **120c** is aligned with and magnetically coupled to the mount magnet **122d**, and the case magnet **120d** is aligned with and magnetically coupled to the mount magnet **122a**. Alternatively, the case **102** can be positioned in an inverted landscape position with case magnets **120a**, **120b**, **120c**, and **120d** aligned with mount magnets **122d**, **122a**, **122b**, **122c**, respectively. The case **102** can also be positioned in an inverted portrait position with case magnets **120a**, **120b**, **120c**, and **120d** aligned with mount magnets **122c**, **122d**, **122a**, and **122b**, respectively.

[0044] As described above, the case **104** of the illustrated embodiment may be couplable to the mount **106** in four different orientations. In other embodiments, however, the case **104** may be couplable to the mount **106** in a different number of configurations. For example, in some embodiments, the case **104** may be couplable to the mount **106** in any desired number of orientations. In these other embodiments, the recess may include any desired number of cut-outs and case magnets while the protrusion may include any desired number of tabs and mount magnets to ensure that the case is couplable to the mount in the desired number of orientations. In the illustrated embodiment, the tabs **118** on the protrusion **112** extend radially outward, and the cutouts **116** on the recess **114** extend radially outward. In other embodiments, the tabs **118** and cut outs **116** may extend radially inward, although such a configuration would decrease the area within the recess **114**, which may impact space available to accommodate wireless charging features, as discussed in greater detail below.

[0045] In the embodiments shown in FIGS. 1A-B, the case and mount magnets are disk-shaped magnets. In other embodiments, however, the case magnets and mount magnets may have different shapes. For example, in some embodiments, the case and mount magnets have a generally triangular shape (see FIG. 12B). Triangle-shaped magnets can better conform to the outer edges of the protrusion **112** and recess **114**, allowing for a larger recess and protrusion relative to the mount **106** and case **104**, respectively (i.e., larger diameter or area). Increasing the size of the recess and protrusion can help ensure that the wireless charging capabilities of the device are not inhibited by the case.

[0046] In the embodiment shown in FIG. 1B, the recess **114** extends completely through the rear surface **110** of the case **104** so that the rear surface of the device **102** is exposed and accessible via the recess **114**. As a result, when the case **104** is mounted onto the mount **106** and the protrusion **112** is received within the recess **114**, the surface of the protrusion **112** is immediately adjacent to or in direct contact with the rear surface of the device **102**. In other embodiments, however, the recess **114** does not extend all the way through the rear surface **110** of the case **104**. In these embodiments, the portion of the rear surface of the device **102** adjacent to the recess **114** remains covered and protected by a thin layer of the case material (e.g., plastic). As a result, when the case **104** is coupled to the mount **106** and the protrusion **112** is received within the recess **114**, a thin layer of the case material remains interposed between the protrusion **112** and the rear surface of the device **102**. The thin layer, however, is configured to minimize any substantive interference with wireless charging of the device **102**.

[0047] To facilitate wireless charging, many modern devices **102** include a wireless charging receiver within and positioned adjacent to the rear surface of the device **102**. When the device **102** is placed on a wireless charging pad, current flowing through an inductive coil in the pad interacts with the wireless charging receiver in the device, causing current to flow within the receiver, thereby charging the device's battery. However, if the distance between the wireless charging receiver and the wireless charging pad is too large, or if conductive material (e.g., metal) is located between the wireless charging receiver and the wireless charging pad, wireless charging of the device may be prevented or inhibited. In addition, if the wireless charging receiver and the wireless charging pad are positioned relative to each other so that the respective coils are misaligned, the result is a less efficient power transfer to the PED's battery. The case **104** and mount **106** configuration of the illustrated embodiments helps insure proper alignment easily and quickly every time so as to reliably provide efficient power transfer to the PED.

[0048] The wireless charging receiver is typically formed from a conductive coil arranged in the center of the rear surface of the device **102**. To ensure that the case **104** does not limit the wireless charging capabilities of the device **102**, the recess **114** is configured to be positioned directly over the conductive coil. Similarly, the case magnets **120a-d** are configured to be positioned away from the wireless charging circuitry so as not to interfere with the conductive coil. In embodiments where the recess **114** extends completely through the rear surface **110**, the rear surface of the device **102** is exposed, allowing a wireless charging pad received within the recess **114** to be placed in direct contact with the rear surface of the device, thereby enabling wireless charging of the device **102**. In embodiments where the recess **114** does not extend completely through the rear surface **110**, the remaining layer of case material that covers the rear surface of the device **102** is sufficiently thin so a wireless charging pad received within the recess **114** is close enough to the conductive coil that wireless charging through the remaining layer is enabled.

[0049] To allow the device **102** to be wirelessly charged while the case is coupled to the mount, the mount may incorporate a wireless charging pad. FIG. 2A is an isometric view of a mount **206** that includes a wireless charging pad **228** coupled to the receiving surface **209** of the mount **206**.

and FIG. 2B is a top cut-away view of the wireless charging pad 228. The wireless charging pad 228 includes a coil 229 configured to receive a current from a power source coupled to the wireless charging pad 228. The coil 229 is positioned within the protrusion 212 such that it is closely adjacent to the surface of the protrusion 212. In this way, the current from the coil 229 can pass through the protrusion 212, thereby enabling the wireless charging of a device coupled to the mount 206 due to the proximity of the wireless charging receiver in the device and the coil 229 when the protrusion 212 is received within the recess of the case. The mount 206 also includes a plurality of mount magnets 222 positioned around the protrusion 212 and the coil 229 such that the mount magnets 222 are configured to magnetically couple to case magnets (e.g., case magnets 120a-d FIG. 1B) when the case is coupled to the mount 206 without significantly interfering with the wireless charging ability of the wireless charging pad 228. Tabs 218 formed as part of the protrusion 212 act as alignment and anti-rotation features when received within cut-outs in the device case (e.g., cut-outs 116 of FIG. 1B).

[0050] In the embodiment shown in FIGS. 1A and 2A, the mounts 106 and 206 are desk mounting apparatuses configured to be used on a flat and stationary surface. In other embodiments, however, the mount may be a car mount configured to securely hold and align a device for a user when the user is operating a vehicle. FIG. 3 shows an isometric view of a mount 306 having a wireless charging pad 328 coupled to an adjustable support arm 334. The mount 306 includes an attachment apparatus, such as suction cup 332, that securely couples the mount 306 to a surface of the car (e.g., the inside of the windshield, the dashboard, etc.), ensuring that the mount 306 does not move during operation of the car. The support arm 334 may be an adjustable support arm having a latch 338 that enables a user to adjust the length of the support arm 334 and a knob 340 may be used to adjust the angle of the wireless charging pad 328 to improve the visibility of the received device. The support arm 334 is coupled to the suction cup 332 with an adjustable hinge 342 and a knob 343 coupled to the adjustable hinge 342 is used to secure the support arm 334 and hinge at a desired angle. The wireless charging pad 328 can be coupled to a power source (e.g., the cigarette lighter receptacle in the vehicle) to enable wireless charging between the mount 306 and a coupled device. The mount 306 may also include a plurality of mount magnets adjacent to the protrusion 312 and configured to be magnetically coupled to the case magnets (e.g., case magnets 120a-d) in the case 104 (FIG. 1B).

[0051] In other embodiments, the mount may be an arm-strap mounting apparatus configured to be removably coupled to a user's arm. FIGS. 4A-4C show a mount 406 having an arm strap portion 444 and a receiving plate portion 446. The receiving plate portion 446 includes a protrusion 412 configured to be received in a recess on a PED case (e.g., case 104 of FIGS. 1A and 1B), and tabs 418 on the protrusion 412 are configured to be received within cut-outs 116 in the recess 114 (FIG. 1B). The mount 406 also includes a plurality of mount magnets 422 disposed within holes 448 in the mounting plate 446 and configured to be magnetically coupled to case magnets in the case when the mount 406 receives the case. The arm mounting apparatus enables a user to have quick access to a device coupled to the mount 406 without having to use a hand to hold the device

while ensuring that the device remains securely coupled to the mount 406. While this embodiment is described with a strap that can be worn on an arm of the user, the strap can be configured to be worn on other portions of the user's body or for use with other support structures to which the strap can be attached.

[0052] In other embodiments, the mount may be a handle-bar mounting apparatus configured to attach to the handle-bars of, as an example, a bicycle, motorcycle, scooter, etc. FIGS. 5A-5C show a mount 506 formed from a receiving plate 546 and a bracket that includes an upper bracket portion 550 coupled to the receiving plate 546 and a lower bracket portion 552 releasably coupled to the upper bracket portion 550 and the receiving plate 546. The upper and lower bracket portions 550 and 552 define a handlebar opening 553 configured to receive the handlebars of a bicycle or similar bar-type support structure. To ensure that the mount 506 remains securely attached to the handlebars, the receiving plate 546 and the upper bracket portion 550 are securely coupled to the lower bracket portion 552 with a hinge shaft 554 coupled between the upper and lower bracket portions 550 and 552. A screw 556 or other fastener passes through an opening in the receiving plate 546 and is removably received within a fastener hole in the lower bracket portion 552. The receiving plate 546 also includes a protrusion 512 having tabs 518 and a plurality of mount magnets 522, all of which act as alignment and/or anti-rotation features configured to securely couple the mount 506 to a device case 104 (FIG. 1B).

[0053] In an alternative embodiment, the mount may be a clip apparatus configured to be fastened, for example, to a user's belt or other analogous support structure. FIGS. 6A and 6B show a mount 606 having a clip portion 660 rotatably coupled to a receiving plate 646 with a hinge 659. A spring 658, which is coupled between the clip portion 660 and a rear surface of the receiving plate 646 and positioned adjacent to the hinge 659, applies a restoring force on the clip portion 660 to rotate the clip portion 660 about the hinge 659 towards the rear surface of the receiving plate 646. The force applied by the spring 658 on the clip portion 660 securely fastens the mount 606 to a support structure, such as a user's belt, waistband, pocket, purse, bag, or other similar type of mounting structure when the support structure is positioned between the clip portion 660 and the back surface of the receiving plate 646. The mount 606 also includes a protrusion 612 having tabs 618 formed at an opposite end of the mount 606 from the clip portion 660, where the protrusion 612 and tabs 618 act as alignment and/or anti-rotation features configured to securely couple the mount 606 to a device case 104 (FIG. 1B). In the illustrated embodiment, the central portion of the protrusion 612 is hollow, which results in a lighter weight unit requiring less material during manufacture.

[0054] In still other embodiments, the mount may be a hand strap apparatus configured to be removably coupled to a user's hand. FIGS. 7A and 7B show a mount 706 having a receiving plate 746 coupled to a hand strap portion 762. The hand strap portion 762 is formed from a flexible material and is configured to securely receive a user's hand. The mount 706 also includes a protrusion 712 having tabs 718, where the protrusion 712 and tabs 718 act as alignment and/or anti-rotation features configured to securely couple the mount 706 to a device case 104 (FIG. 1B). In the illustrated embodiment, the central portion of the protrusion

712 can also be hollow. In other embodiments, however, the mount **706** includes a wireless charging pad position in and/or adjacent to the protrusion **712**. Accordingly, when the device **102** and the case **104** (FIG. 1A) are releasably attached to the mount, wireless charging of the device **102** is enabled, while still allowing the device **102**, the case **104**, and the mount **706** with its integral charging pad, to be carried and used, such as by attaching the hand strap portion **762** to the user's hand, while the device **102** continues to charge. The mount **706** may be coupled to a power source via a power cable or other electrical line, or a portable power source (e.g., a battery) may be included in the mount **706** and used to provide power to a coupled device via the wireless charging pad in the mount **706** while maintaining the mobility of the charging device.

[0055] In the embodiments shown in FIGS. 6A-7B, the mounts **606**, **706** can be manufactured of a ferrous-based material, such that mount magnets may not be needed around the protrusions **612**, **712** (e.g., case magnets **120** of FIG. 1B). In other embodiments, however, the mounts **606**, **706** do include mount magnets spaced around the protrusions **612**, **712** and configured to magnetically couple to case magnets in a device case when the mounts **606**, **706** are coupled to the device case **104** (FIG. 1B).

[0056] In the embodiments shown in FIGS. 1A and 1B, the case **104** and the mount **106** include disk-shaped permanent magnets having a single north pole and a single south pole. In other embodiments, however, the case and mount include multiple arrays of magnets. FIG. 8A shows a front elevation view of a case **804** having four arrays **864a-d** of case magnets **866** and FIG. 8B shows an enlarged isometric view of one of the arrays **864d**. The arrays **864a-d** are disposed in an inner surface **826** of the case **804** and are symmetrically arranged around a central point in a recess **814**, which extends through the case **804**.

[0057] In the illustrated embodiment, each of the four case magnets **866** in a given array **864** is a wedge-shaped permanent magnet having a single north pole and single south pole, where two of the case magnets **866** in a given array have north poles facing a first direction while the other two case magnets **866** have north poles facing an opposite direction. The four case magnets **866** within a given array **864** are arranged into a circular arrangement such that the array **864** is disk-shaped. In the array **864d** shown in FIG. 8B, the north poles of the first and fourth case magnets **866a** and **866d** face the device received within the case **804** (e.g., device **102** shown in FIG. 1A) while the north poles of the second and third case magnets **866b** and **866c** face away from the device.

[0058] The case **804** is configured to be securely coupled to a mount having a protrusion and mount magnets, where the recess **814** is configured to receive the protrusion and the case magnets **866** are configured to magnetically couple to the mount magnets. In order to maximize the strength of magnetic coupling between the mount magnets and the case magnets **866**, the mount magnets may be wedge-shaped permanent magnets arranged in a circular arrangement to form disk-shaped arrays. The arrays of mount magnets are symmetrically positioned around a central point on the protrusion such that, when the case **804** is coupled to the mount, each of the case magnets **866** is positioned directly over one of the mount magnets. The mount magnets may be oriented such that each of the case magnets **866** is magnetically attracted to the mount magnet over which the case

magnet **866** is arranged. For example, when the case **804** is coupled to the mount, the wedge-shaped mount magnets positioned directly below the first and fourth case magnets **866a** and **866d** have south poles facing the mount (and north poles facing away from the mount) while the mount magnets positioned directly below the first and fourth case magnets **866a** and **866d** have north poles facing the case **804** (and south poles facing away from the case **804**). Similarly, the second and third case magnets **866b** and **866c** have north poles facing the mount (and south poles facing away from the mount) while the mount magnets positioned directly below the second and third case magnets **866b** and **866c** have south poles facing the case **804** (and north poles facing away from the case **804**). In this way, each of the case magnets **866** are magnetically attracted to the corresponding mount magnets positioned below the case magnets **866**.

[0059] The arrays **864** of case magnets **866** are rotationally symmetric about a center point in the recess **814**. For example, each of the case magnets **866** within a given one of the arrays **864** has a given position and orientation when the case **804** is in a first orientation (e.g., a portrait orientation). Rotating the case **804** by 90° about a center point in the recess **814** causes the case **804** to transition from the first orientation to a second orientation (e.g., a landscape orientation). In the second orientation, each of the case magnets **866** within the given one of the arrays **864** is in the same position and has the same orientation as a case magnet **866** in a different one of the arrays **864** when the case **804** was in the first orientation. This arrangement enables the case **804** to be couplable to the mount in four different configurations.

[0060] For example, if the user desires for the device to operate in portrait mode, the user may couple the case **804** to the mount such that a top edge of the case **804** faces upwards. In this orientation, each of the case magnets **866** having south poles facing the mount (e.g., case magnets **866a** and **866d**) are arranged over a mount magnet having a south pole facing the case **804** and each of the case magnets **866** having north poles facing the mount (e.g., case magnets **866b** and **866c**) are arranged over a mount magnet having a south pole facing the case **804**. However, if the user desires for the device to operate in landscape mode, the user may couple the case **804** to the mount such that the top edge of the case **804** is facing to the right. In this configuration, each of the case magnets **866** having south poles facing the mount will still be positioned over a mount magnet having a north pole facing the case **804** and each of the case magnets **866** having north poles facing the mount will be still be positioned over a mount magnet having a south pole facing the case **804**. In this way, each of the case magnets **866** is magnetically attracted to the corresponding mount magnet over which the case magnet **866** is positioned regardless of the orientation in which the case **804** is coupled to the mount.

[0061] In other embodiments, the device case includes case magnets arranged in triangle-shaped arrays. FIGS. 9A and 9B show views of an alternative embodiment of a personal electronic device case having multiple arrays of magnets. FIG. 9A shows a front elevation view of a case **904** having four arrays **964a-d** of case magnets **966** and FIG. 9B shows an enlarged isometric view of one of the arrays **964d**. The arrays **964a-d** are disposed in an inner surface **926** of the case **904** and are symmetrically arranged around a central point in a recess **914**, which extends through the case **904**.

In this embodiment, each of the four case magnets **966** is a triangle-shaped permanent magnet having a single north pole and a single south pole. In each array **964**, the two case magnets **966** have north poles facing a first direction while the other two case magnets **966** have north poles facing an opposite direction. The four case magnets **966** within a given array **964** are arranged into a triangular arrangement such that the array **964** is also triangle-shaped. In the array **964d** shown in FIG. 9B, the north poles of the first and fourth case magnets **966a** and the **966d** face the device received within the case **904** (e.g., device **102** shown in FIG. 1A) while the north poles of the second and third case magnets **966b** and **966c** face away from the device.

[0062] As in the embodiments described above in connection with FIGS. 8A and 8B, the case **904** is configured to be securely coupled to a mount having mount magnets, where the recess **914** is configured to receive the protrusion and the case magnets **966** are configured to magnetically couple to the mount magnets. The mount magnets may be triangle-shaped permanent magnets arranged into a triangular arrangement to form triangle-shaped arrays and symmetrically positioned around a central point on the protrusion such that, when the case **904** is coupled to the mount, each of the case magnets **966** is positioned directly over one of the mount magnets. The mount magnets may be oriented such that each of the case magnets **966** is magnetically attracted to the corresponding mount magnet over which the case magnets **966** are rotationally symmetric about a center point in the recess **914** such that the case **904** is couplable to the mount in four different orientations, where each of the case magnets **966** is magnetically attracted to the corresponding mount magnet over which the case magnet **966** is positioned regardless of the orientation in which the case **904** is coupled to the mount.

[0063] In the embodiments shown in FIGS. 8A-9B, the arrays of case magnets (and the corresponding arrays of mount magnets) include magnets having north poles facing either a first direction or an opposing second direction opposite the first direction. In other embodiments, however, the arrays of magnets also include magnets having north poles facing a third direction perpendicular to the first and second directions and a fourth direction opposite the third direction such that the magnets form a shape similar to a Halbach array. When an array of magnets is arranged in a Halbach array, the strength of a magnetic field from the array is greater in a first direction than in an opposing direction. As a result, the strength of the magnetic field for the arrays **864**, **964** of case magnets **866**, **966** may be stronger in the direction facing away from a received device than in the direction facing the received device. Similarly, the strength of the magnetic field for the arrays of mount magnets may be stronger in the direction facing the cases **804**, **904** than in the direction facing away from the cases **804**, **904**. This arrangement can increase the effective strength of the magnetic coupling between the case and the mount while limiting any potential magnetic interference between the case magnets **866**, **966** and the received device.

[0064] In some embodiments, the mount may also include a clamping mechanism that functions as an additional alignment and anti-rotation feature. FIG. 10A is an isometric view of a mount **1006** having a clamping mechanism and FIG. 10B is an isometric view of a case **1004** received within the mount **1006**. The mount **1006** includes a protrusion **1012**

configured to be received within a recess in the case **1004** and mount magnets **1022** configured to magnetically couple to case magnets **1020** on the case **1004**. The mount **1006** also includes clamps **1068** having ends **1070** configured to be received in openings **1074** formed along the edges of the case **1004** and grips **1072** operatively coupled to the clamps **1068** and configured to be used to adjust the position of the ends **1070** of the clamps **1068**. When coupling the case **1004** to the mount **1006**, a user may use the grips **1072** to adjust the position of the clamps **1068** to ensure that the ends **1070** are securely positioned within the openings **1074**. In this way, the clamps **1070** act as an additional alignment and anti-rotation feature that prevents the case **1004** from pulling away from the mount **1006**. The clamp also resists rotation of the case **1004** relative to the mount **1006**.

[0065] In the embodiments shown in FIGS. 1A-B, 8A-B, and 9A-B, the alignment and anti-rotation features (e.g., the recess **114**, cut-outs **116**, and case magnets **120**) are formed as part of a case configured to receive a PED. In other embodiments, however, the alignment and anti-rotation features may be formed as part of an interface plate configured to be attached to the rear surface of a personal electronic device or to the rear surface of a case in which the personal electronic device is already received. FIG. 11 is an isometric view of an interface plate **1176** having a recess **1114** that includes cut-outs **1116** and configured to receive a protrusion having tabs formed as part of a mount (e.g., protrusion **112** having tabs **118** on mount **106** of FIG. 1A) when the interface plate **1176** is coupled to the mount.

[0066] The recess **1114** is sized and shaped such that, when the interface plate **1176** is properly coupled to the device (or case), the recess **1114** is positioned directly over wireless charging circuitry within the device and does not inhibit the wireless charging capabilities of the device when the device is coupled to a mount having a wireless charging capabilities (e.g., mount **206** of FIG. 2A or mount **306** of FIG. 3). An adhesive or other attachment mechanism can be applied to a rear surface **1178** of the interface plate **1176** is configured to adhere the interface plate **1176** to the rear surface of the device or device case. Attaching the interface plate **1176** to a device (or a case) enables a user to securely couple the device to a mount (e.g., mount **106** of FIG. 1A) without having to utilize a case specifically configured to be coupled to the mount.

[0067] In the embodiment shown in FIG. 11, the interface plate **1176** includes a generally circular recess **1114** having tabs and embedded case magnets (e.g., case magnets **120**). In other embodiments, however, the interface plate may include a recess having a different shape and may include case magnets configured to magnetically couple to mount magnets on a mount. For example, FIG. 12A shows an interface plate **1276a** having a generally circular recess **1214a** and circular case magnets **1220a** distributed around the recess **1214a**. On the other hand, FIG. 12B shows an interface plate **1276b** having a generally circular recess **1214b** and generally triangular case magnets **1220b** distributed around the recess **1214b**. The triangular case magnets **1220b** have a curved edge that conforms to the curvature of the recess **1214b**. As discussed above in connection with FIGS. 1A and 1B, using generally triangular case magnets allows for a larger recess **1214b** while the size of the case magnets is unchanged or increased. This further ensures that the wireless charging capabilities of the device are not inhibited.

[0068] FIG. 12C shows an interface plate 1276c having a recess 1214c formed from a 24-sided polygon in the shape of a star having 12 points. The interface plate 1276c may also include four case magnets 1220c distributed around the recess 1214c. The shape of the recess 1214c enables the interface plate 1276c to be coupled a mount having a similarly-shaped protrusion in 12 different orientations with some magnetic retention due to the proximity of the magnets in each position. The strongest magnetic coupling between the case magnets 1220c and mount magnets on the mount, however, will occur when the interface plate 1276c is oriented in four of the orientations with direct magnetic alignment.

[0069] FIG. 12D shows an interface plate 1276d having a recess 1214d and case magnets 1220d. The recess 1214d is generally circular shaped but has notches adjacent to each of the case magnets 1220d to accommodate the case magnets 1220d. This increases the size of the recess 1214d, thereby ensuring that the wireless charging capabilities of the device are not inhibited by the interface plate 1276d.

[0070] From the foregoing, it will be appreciated that specific embodiments of the invention have been described herein for purposes of illustration, but that various modifications may be made without deviating from the scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

I/We claim:

1. A mounting assembly for a personal electronic device, comprising:

a case having a back wall and sidewalls connected to the backwall to define an interior area configured to receive the personal electronic device, the back wall having: opposing front and rear surfaces, the front surface facing toward the interior area and being configured to be positioned adjacent to the personal electronic device when the personal electronic device is received within the interior area;

a recess in the rear surface, the recess having a central portion and a plurality of registration recesses spaced radially apart from each other; and

a case magnet positioned adjacent to the recess and spaced apart from the central portion; and

a mounting structure releasably engageable with the case at a selected radial orientation, the mounting structure comprising:

a receiving surface configured to be positioned adjacent to rear surface when the case is engaged with the mounting structure;

a protrusion extending away from the receiving surface and configured to be securely received in the recess when the case is coupled to the mounting structure, the protrusion having a central protuberance that fits closely in the central portion of the recess, and one or more radial registration protuberances is positioned to fit in selected ones of the registration recesses to control a selected radial orientation of the case relative to the mounting structure; and

a mount magnet positioned adjacent to the protrusion and arranged to align with the case magnet when the case is coupled to the mounting structure in the selected radial orientation, wherein the case is mechanically and magnetically restricted from rotating when the case is engaged with the mounting structure.

2. The mounting assembly of claim 1 wherein the mounting structure has a retention portion configured to releasably mount to a vehicle, a handlebar, or a wearable strap.

3. The mounting assembly of claim 1 wherein the mounting structure comprises a clamping member configured to releasably attach to a mounting support.

4. The mounting assembly of claim 1 wherein the case magnet is a first case magnet and the mount magnet is a first mount magnet, the mounting assembly further comprising: a second case magnet positioned adjacent to the recess and spaced radially apart from the first case magnet; and

a second mount magnet positioned adjacent to the protrusion and spaced radially apart from the first mount magnet, wherein, when the case is coupled to the mounting structure in the selected radial orientation, the second case magnet is positioned over and magnetically coupled to the second mount magnet.

5. The mounting assembly of claim 1 wherein the selected orientation is a first orientation, and the case being positionable in a second radial orientation relative to the mounting structure, and the second orientation is different from the first orientation;

the case magnet is a first case magnet, and the case has a second case magnet spaced radially apart from the first case magnet; and

when the case is coupled to the mounting structure in the first radial orientation, the first case magnet is positioned over and magnetically coupled to the mount magnet, and

when the case is coupled to the mounting structure in the second radial orientation, the second case magnet is positioned over and magnetically coupled to the mount magnet.

6. The mounting assembly of claim 1 wherein—

the selected orientation is a first orientation, and the case being positionable in a second radial orientation relative to the mounting structure, and the second orientation is different from the first orientation; the mount magnet is a first mount magnet, and the mounting structure has a second mount magnet spaced radially apart from the first mount magnet; and

when the case is coupled to the mounting structure in the first radial orientation, the first case magnet is positioned over and magnetically coupled to the first mount magnet, and

when the case is coupled to the mounting structure in the second radial orientation, the first case magnet is positioned over and magnetically coupled to the second mount magnet.

7. The mounting assembly of claim 1, wherein the selected radial orientation is a first radial orientation, and the case being positioned relative to the mounting structure in a second radial orientation, a third radial orientation or a fourth radial orientation when the case is engaged with the mounting structure with the protrusion in the recess; and

wherein the case magnet is a first case magnet, and the case having second, third and fourth case magnets arranged radially apart from each other, and wherein the registration recess is a first registration recess and the plurality of registration recesses comprises second, third and fourth registration recesses,

when the case is coupled to the mounting structure in the first orientation, the first case magnet is positioned over

and magnetically coupled to the mount magnet and the registration protuberance is positioned in the first registration recess,

when the case is coupled to the mounting structure in the second orientation, the second case magnet is positioned over and magnetically coupled to the mount magnet and the registration protuberance is positioned in the second registration recess,

when the case is coupled to the mounting structure in the third orientation, the third case magnet is positioned over and magnetically coupled to the mount magnet and the registration protuberance is positioned in the third registration recess, and

when the case is coupled to the mounting structure in the fourth orientation, the fourth case magnet is positioned over and magnetically coupled to the mount magnet and the registration protuberance is positioned in the fourth registration recess.

8. The mounting assembly of claim 7 wherein the first, second, third, and fourth case magnets are symmetrically arranged around a central point of the recess and wherein the first, second, third, and fourth registration recesses are symmetrically arranged around the central portion of the recess.

9. The mounting assembly of claim 1, wherein the selected radial orientation is a first radial orientation, and the case being positioned relative to the mounting structure in a second radial orientation, a third radial orientation or a fourth radial orientation when the case is engaged with the mounting structure with the protrusion in the recess; and

wherein the mount magnet is a first mount magnet, and the mounting structure having second, third and fourth mount magnets arranged radially apart from each other, and wherein the registration protuberance is a first registration protuberance and the mounting structure has second, third and fourth registration protuberance spaced radially apart from each other,

when the case is coupled to the mounting structure in the first orientation, the case magnet is positioned over and magnetically coupled to the first mount magnet and the first registration protuberance is positioned in the registration recess,

when the case is coupled to the mounting structure in the second orientation, the case magnet is positioned over and magnetically coupled to the second mount magnet and the second registration protuberance is positioned in the registration recess,

when the case is coupled to the mounting structure in the third orientation, the case magnet is positioned over and magnetically coupled to the third mount magnet and the third registration protuberance is positioned in the registration recess, and

when the case is coupled to the mounting structure in the fourth orientation, the case magnet is positioned over and magnetically coupled to the fourth mount magnet and the fourth registration protuberance is positioned in the registration recess.

10. The mounting assembly of claim 9 wherein the first, second, third, and fourth mount magnets are symmetrically arranged around the central protuberance and wherein the first, second, third, and fourth registration protuberances are symmetrically arranged around the central protuberance.

11. The mounting assembly of claim 9 wherein each of the first, second, third, and fourth radial orientations are

approximately 90 degrees from two of the radial orientations and approximately 180 degrees from the other radial orientation.

12. The mounting assembly of claim 1 wherein—

the central protuberance of the protrusion comprises a generally circular central protuberance and the radial registration protuberance is an anti-rotation tab extending radially away from a central protuberance, and

the central portion of the recess comprises a generally circular recess connected to the plurality of registration recesses positioned to receive the at least one anti-rotation tab such that, when the case is coupled to the mounting structure, the at least one anti-rotation tab is positioned within a selected one of the registration recesses.

13. The mounting assembly of claim 1, the personal electronic device includes a wireless charging receiver, and wherein the central portion of the recess is shaped and sized to align with the wireless charging receiver when the personal electronic device is received within the case, and wherein the case magnet is positioned to be spaced radially away from the wireless charging receiver.

14. The mounting assembly of claim 13 wherein the mounting structure further comprises:

a wireless charging pad coupled to the receiving surface, wherein the wireless charging pad is configured to provide a current received from a power source to the protrusion and wherein the protrusion functions as a wireless charging transmitter that transmits the received current to the wireless charging receiver in the personal electronic device to wirelessly charge the personal electronic device.

15. A mounting assembly for a personal electronic device, comprising:

a case configured to securely receive the personal electronic device, the case having:

a recess formed in a rear surface of the case;

a first plurality of case magnets arranged to form a first array positioned adjacent to the recess such that each of the first plurality of case magnets does not overlap with the recess; and

a second plurality of case magnets arranged to form a second array positioned adjacent to the recess such that each of the second plurality of case magnets does not overlap with the recess; and

a mounting structure releasably couplable to the case with the case in a selected orientation, wherein the mounting structure is configured to securely hold the case at the selected orientation, the mounting structure has:

a protrusion extending away from a receiving surface and configured to be securely received in the recess when the case is coupled to the mounting structure;

a first plurality of mount magnets arranged to form a third array positioned adjacent to the protrusion such that each of the first plurality of mount magnets does not overlap with the protrusion; and

a second plurality of mount magnets arranged to form a fourth array positioned adjacent to the protrusion such that each of the second plurality of mount magnets does not overlap with the protrusion and wherein, when the case is coupled to the mounting structure in the selected orientation, individual ones of the first plurality of case magnets are positioned over and magnetically coupled to individual ones of the

first plurality of mount magnets and individual ones of the second plurality of case magnets are positioned over and magnetically coupled to individual of the second plurality of mount magnets.

16. The mounting assembly of claim **15**, wherein—
the first plurality of mount magnets comprises a first mount magnet having a first north pole and a second mount magnet having a second north pole,
the first and second mount magnets are coupled to the mounting structure such that the first north pole faces in a first direction and the second north pole faces in a second direction opposite the first direction,
the first plurality of case magnets comprises a first case magnet having a third north pole and a second case magnet having a fourth north pole, and
when the case is coupled to the mounting structure, the first case magnet is positioned over the first mount magnet, the second case magnet is positioned over the second mount magnet, the third north pole faces in the first direction such that the first case magnet is magnetically coupled to the first mount magnet, and the fourth north pole faces in the second direction such that the second case magnet is magnetically coupled to the second mount magnet.

17. The mounting assembly of claim **16**, wherein—
the first plurality of mount magnets comprises a third mount magnet having a fifth north pole and a fourth mount magnet having a sixth north pole,
the first and second mount magnets are coupled to the mounting structure such that the fifth north pole faces in the first direction and the sixth north pole faces in the second direction,
the first plurality of case magnets comprises a third case magnet having a seventh north pole and a fourth mount magnet having an eighth north pole, and
when the case is coupled to the mounting structure, the third case magnet is positioned over the third mount magnet, the fourth case magnet is positioned over the fourth mount magnet, the seventh north pole faces in the first direction such that the third case magnet is magnetically coupled to the third mount magnet, and the eighth north pole faces in the second direction such that the fourth case magnet is magnetically coupled to the fourth mount magnet.

18. The mounting assembly of claim **15** wherein—
the selected orientation comprises a first orientation,
the case is releasably couplable to the mounting structure in a second orientation different from the first orientation,

when the case is coupled to the mounting structure in the second orientation, individual of the first plurality of case magnets are positioned over and magnetically coupled to individual of the second plurality of mount magnets and individual of the second plurality of case magnets are positioned over and magnetically coupled to individual of the first plurality of mount magnets.

19. A mounting assembly for a personal electronic device, comprising:

a case having an interior area configured to receive the personal electronic device, the case having a recess formed therein with a central portion and a plurality of registration recesses spaced apart from each other; and
a case magnet positioned adjacent to the recess and spaced apart from the central portion; and

a mounting structure releasably engageable with the case at a selected orientation, the mounting structure comprising:

a protrusion configured to be securely received in the recess when the case is engaged with the mounting structure, the protrusion having a central protuberance that fits closely in the central portion of the recess, and one or more registration protuberances adjacent to the central protuberance and positioned to fit in selected ones of the registration recesses to control a selected orientation of the case relative to the mounting structure; and

a mount magnet positioned adjacent to the protrusion and arranged to align with the case magnet when the case is engaged with the mounting structure in the selected orientation, wherein the case is mechanically and magnetically restricted from rotating when the case is engaged with the mounting structure.

20. A mounting assembly of claim **19**, wherein the number of registration recesses equals the number of registration protuberances.

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